

Missouri Resources

Spring 2017 • Volume 34 • Number 2



director's comment

I am delighted to join Governor Greitens' executive cabinet and lead the Missouri Department of Natural Resources' efforts to protect our air, land and water; preserve our unique natural and historic places; and provide recreational and learning opportunities for everyone.

As an attorney with extensive experience addressing environmental issues in both government and business, I firmly believe that environmental protection and economic growth are not mutually exclusive. Missouri can't have a healthy environment without a healthy economy, but the state won't have a healthy economy without a healthy environment.

We all want clean air, clean water and clean land, but burdensome regulations and time-consuming paperwork that provide minimal protection to our natural resources and public health are not the answer. They restrict business growth and interfere with improving our economy.

As director, my goal will be to continue protecting Missouri's air, land and water quality while encouraging economic growth so that Missouri and all Missourians prosper. It's the worthiest of missions and it can be done.

We will find sensible solutions that address all concerns by improving communications and building part-



nerships with those we regulate. As an agency, we will prioritize issuing timely permits so that businesses can build and operate and make investments in the state of Missouri.

We will inspect and monitor permitted facilities to ensure compliance with all legal requirements, but we will work cooperatively with our regulated public. We will ensure our regulated partners are meeting the most current and necessary standards to protect public health and Missouri's environment, and we will provide education and assistance so that facilities are aware of their environmental responsibilities. Our Division of Environmental Quality will operate under

a "compliance first" policy.

We will ensure cleanups progress at contaminated sites to minimize public exposure to waste, but we will look for common sense solutions that will quickly and cost-effectively return those properties to productive use.

We share a common goal of protecting and enhancing Missouri's natural resources, but we need a vibrant and healthy economy to support that goal. Together, we can provide all Missourians a healthy environment in which to live, work and enjoy the great outdoors.

Carol S. Comer

Director, Missouri Department of Natural Resources

Missouri Resources

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Mission Statement

The mission of the Missouri Department of Natural Resources is to protect our air, land and water; to preserve our unique natural and historic places; and to provide recreational and learning opportunities for everyone.

Spring 2017
Volume 34 • Number 2

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MISSOURI RESOURCES is published quarterly by the Missouri Department of Natural Resources to inform readers about important natural resource issues and how they are being addressed. Any correspondence should be directed to the editor at the Department of Natural Resources, Publications, PO Box 176, Jefferson City, MO 65102-0176, or call 800-361-4827. Email address: moresdnr@dnr.mo.gov. MoDNR home page: dnr.mo.gov. To subscribe or unsubscribe online: dnr.mo.gov/magazine/subscription.htm.

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Missouri Resources is printed with soy ink on recycled paper at RR Donnelley in Liberty, Mo.



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2 The Bald Knobs of Missouri

by Summer Young

You can't visualize or even discuss Ozarks geology or topography without acknowledging the prominent rounded peaks that are visible from nearly every vantage point in southern Missouri. Some early inhabitants of the bald knobs were just as prominent.

8 Building on Watershed Success Stories

by Mary Culler

The Missouri Department of Natural Resources' successful watershed initiative, Our Missouri Waters, was started nearly 5 years ago to evaluate and protect the 66 watersheds across our state. The North Fork Salt River Watershed in northeast Missouri proves that it takes committed citizens, landowners and local agencies to move the needle on such an ambitious but important effort.

12 Parks Preserve CCC Legacy

by Tom Uhlenbrock

More than 75 years after President Roosevelt's New Deal in 1933, the Emergency Conservation Work Act created iconic beauty that endures yet today in Missouri's state parks. The Civilian Conservation Corps and Works Progress Administration made "parkitecture" a national symbol.

departments

18 Explore Missouri **20 DNR News** **22 Top Spots** **25 ... But Not Least**

Above: American white pelicans, ring-billed gulls and Bonaparte's gulls relax at Mark Twain Lake, near Florida.

Front cover: Ruins of the stone castle at Ha Ha Tonka State Park are highlighted in the afternoon sun.

Back cover: Katrina Whitener of World Bird Sanctuary displays a Harris's hawk during Statehood Day at First Missouri State Capital State Historic Site in St. Charles. *MoDNR photos by Ben Nickelson.*

The Bald Knobs of Missouri

by Summer Young



The caves, springs and rivers of Missouri's karst geology contribute to the Ozarks' status as a unique tourist destination. Another Ozarks geologic feature played an important role in establishing the Branson area's most widely recognized icon. "Bald knobs" served as meeting places for late 19th-century citizen committees formed to address lawlessness in Taney, Christian and neighboring counties. The prominent,

easily identifiable local landmarks served as strategic meeting places due to their elevation and unique vegetation patterns, which decreased the likelihood of ambush.

The geography of the Ozarks region in southern Missouri is characterized by high and deeply dissected plateaus. In Missouri, the terms "mountain," "hill" and "knob" are often used interchangeably. Ozarks mountains that are topped by an open glade sur-



rounded by forest are called “balds.”

In the popular book, *Geologic Wonders and Curiosities of Missouri*, former state geologist Thomas R. Beveridge defined a bald as “... a mountain with a glade type of vegetation ... a grassy open area surrounded by timber.”

“Missouri balds are composed of dolomites and limestones and have a thin soil cover,” said Joe Gillman, state geologist

and director of the Missouri Department of Natural Resources’ Missouri Geological Survey. “As erosional remnants that often form the summits of main watershed divides, balds stand as prominent, isolated hills of the landscape.”

Although many of these mountains are no longer bare on top due to the invasion of cedar trees, balds or knobs remain a prominent feature of the Missouri Ozarks landscape.

Knobs are visible through the mist near the town of Shell Knob in Barry County.

MoDNR photo by Ben Nickelson

Bald knobs and other geologic features played significant roles in Ozarks settlement patterns and, therefore, influenced many place names. The U.S. Geological Survey's Geographic Names Information System lists more than 300 Missouri geographic names that include the terms bald or knob. Several Missouri towns and cities are named after balds or knobs, including Knob Town, Knobby, Knob Noster, Knob Lick, Pilot Knob and Shell Knob.

Missouri's bald knob clusters include Cooper Knobs in Pike County; Etlah Knobs in Franklin County, and Road Knobs and Sister Knobs in Ozark County.

Dr. Matthew Hernando, professor of history at Ozarks Technical Community College and author of *Faces Like the Devil:*

The Bald Knobber Vigilantes in the Ozarks, described how social, economic and political uncertainty in the Ozarks region after the Civil War led to a rise in vigilante activity.

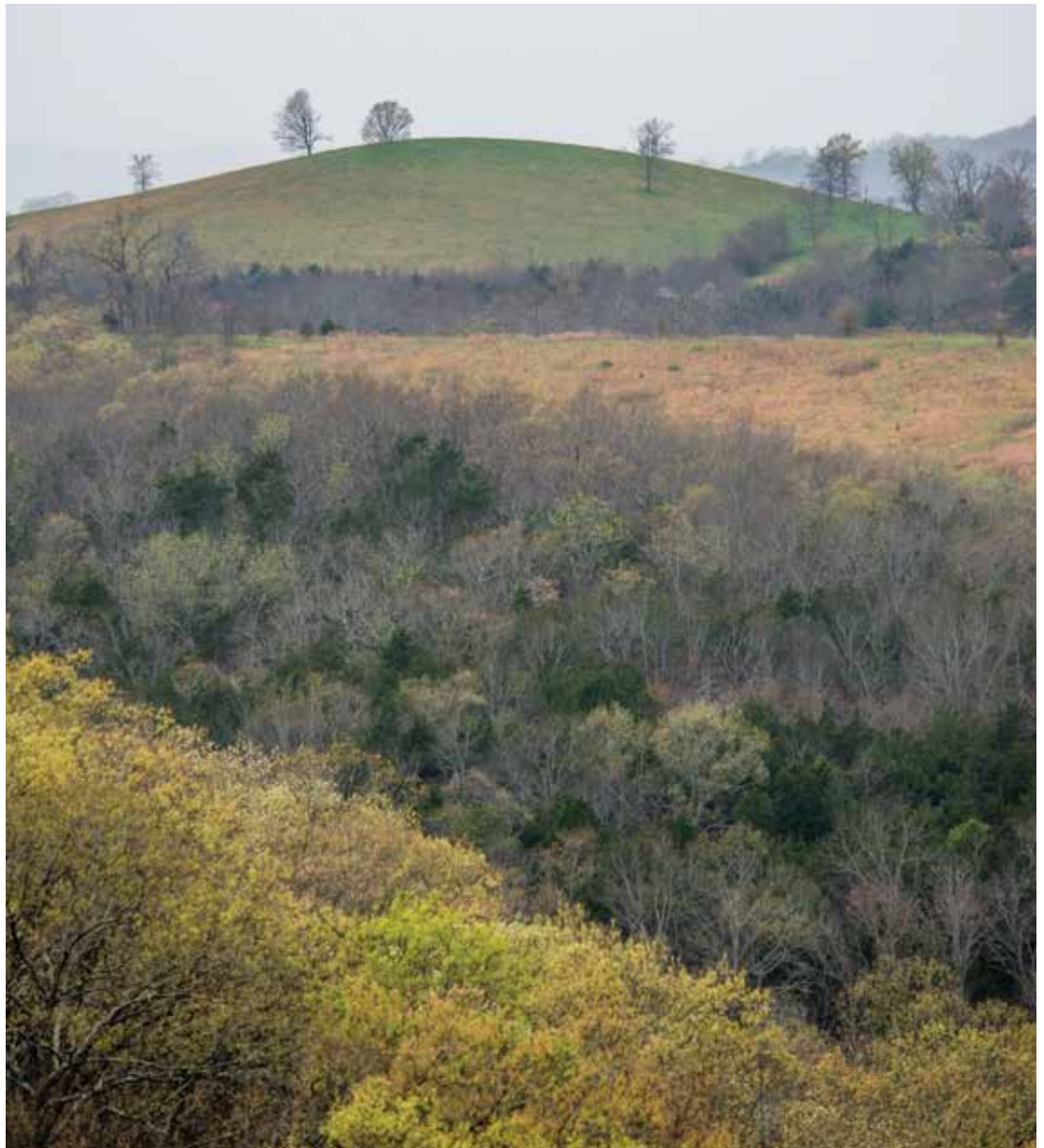
"A strong surge in criminal activity over the two decades following the Civil War angered many residents of the area and caused them to consider alternatives to traditional law enforcement practices," Hernando said.

The population of Taney County changed after the Civil War as settlers from midwestern states and other parts of Missouri moved to the Ozarks. Most of these settlers had supported the northern cause during the Civil War, and their arrival changed the demographics of the mostly southern-sympathizing population that once dominated the area.

One such group of Taney County citi-

**A bald knob viewed
along Missouri Route 76
in Barry County.**

MoDNR photo by Ben Nickelson



THE BALD KNOBBERS REPRESENTED THEMSELVES AS AN ALLIANCE OF TAXPAYERS AND LAW-ABIDING CITIZENS DEDICATED TO FIGHTING RAMPANT CRIME IN THEIR COMMUNITIES AND CORRUPTION IN THEIR LOCAL GOVERNMENT.

– DR. MATTHEW HERNANDO

zens concerned about lawlessness held their first large-scale meeting April 5, 1885, on Snapp's Bald near Kirbyville. Their choice of the well-known landmark led to the group being called the "Bald Knobbers." Similar citizen groups sprang up in neighboring counties, with the Christian County group becoming the most notorious. A Christian County cave may have earned the name Baldknobber Cave by serving as a meeting place for the second Ozarks group to become known as bald knobbers.

Primarily active in the second half of the 1880s, bald knobbers wore face coverings to prevent recognition. These coverings varied, but were generally some version of a cloth hood with knotted corners manipulated to resemble pointed ears or horns, along with eye and mouth openings.

Because newer settlers tended to consider the area's relative lawlessness as an obstacle to economic modernization and industrialization, vigilante activity was viewed by many as necessary to prosperity and growth. After the Civil War, an intense competition for control of county governments developed between political parties. Opponents focused on issues including crime and county debt.



(Left) This mask belonged to a bald knobber from southwest Missouri in the late 19th century.

Bittersweet Collection, R0699, The State Historical Society of Missouri, Photograph Collection

(Bottom) Hiking to the grassy peak of a bald knob offers an unobstructed view of the Ozarks in Taney County.

MoDNR photo by Ben Nickelson

Bald knobber groups, however, sought to address these issues outside the traditional political system.

"The Bald Knobbers represented themselves as an alliance of taxpayers and law-abiding citizens dedicated to fighting



ALTHOUGH MANY OF THESE MOUNTAINS ARE NO LONGER BARE ON TOP DUE TO THE INVASION OF CEDAR TREES, BALDS OR KNOBS REMAIN A PROMINENT FEATURE OF THE MISSOURI OZARKS LANDSCAPE.



Knobs dot the horizon at a scenic overlook along State Highway 39 north of Shell Knob. MoDNR photo by Ben Nickelson

rampant crime in their communities and corruption in their local government,” Hernando said.

The bald knobbers’ status as an enduring Ozarks icon was galvanized by late 19th- and early 20th-century journalists and novelists.

“Accounts of the bald knobbers circulated in newspapers across the country in the late 1880s,” Hernando added.

In 1888, four of the Christian County bald knobbers were convicted of murder. Though their cases were appealed to the Missouri Supreme Court, the convictions were upheld. William Edens got into a scuffle with the four, who were roughing up his brother-in-law for allegedly showing up drunk at church. Edens vowed a fatal revenge if any of the bald knobbers showed up at his home. They did, of course, and tortured him before killing both

Edens and his son-in-law, who just happened to be at Edens’ home.

Christian County geology featured prominently in witness testimony at the trials. The prosecution took great pains to detail the “holer” the bald knobber group members traversed on the way to the site of the murders. Key trial evidence included a map of the area along with recovered masks and lanterns that bald knobbers had tried to hide in a crevice of a ravine.

Several popular and commercially successful novels about the vigilantes were published in the decades that followed. Harold Bell Wright’s 1907 book, *The Shepherd of the Hills*, featured folklore surrounding the bald knobbers along with a general caricature of Ozarks residents. The book achieved enormous commercial success and contributed to the foundation



MoDNR photo by Ben Nickelson

(Top) A dolomite outcrop among the glade-type vegetation is typical of bald summits. These landscapes often are encroached upon by invading cedars.

(Bottom) The rolling Ozarks as viewed from the observation tower on Dewey Bald at Ruth and Paul Henning Conservation Area, west of Branson.

of a local tourism economy that evolved into present-day Branson. It also established the bald knobbers as a prominent symbol of the Missouri Ozarks.

In addition to bald knobs, other fascinating geologic features are highlighted in *Geologic Wonders and Curiosities of Missouri*. Copies

can be purchased at the Missouri Geology Store in Rolla, 111 Fairgrounds Road, or online at missourigeologystore.com.

Summer Young is designated principal assistant for the department's Missouri Geological Survey.



MoDNR photo by Ben Nickelson



Our Missouri Waters Building on Watershed Success Stories

by Mary Culler

Missouri has been blessed with abundant and diverse water resources like few other states in the nation. The quality of life for each Missourian can be closely tied to the health of our state's natural resources. The Missouri Department of Natural Resources is committed to ensuring we are able to enjoy our Missouri waters today as well as promise that same commitment for future generations.

Nearly five years ago, the department launched an effort to increase awareness about the watersheds in which we live and work, receive input from local stakeholders, and build partnerships for maintaining and improving the health of our state's

The Clarence Cannon Wholesale Water Commission's treatment plant provides drinking water to its member systems in 14

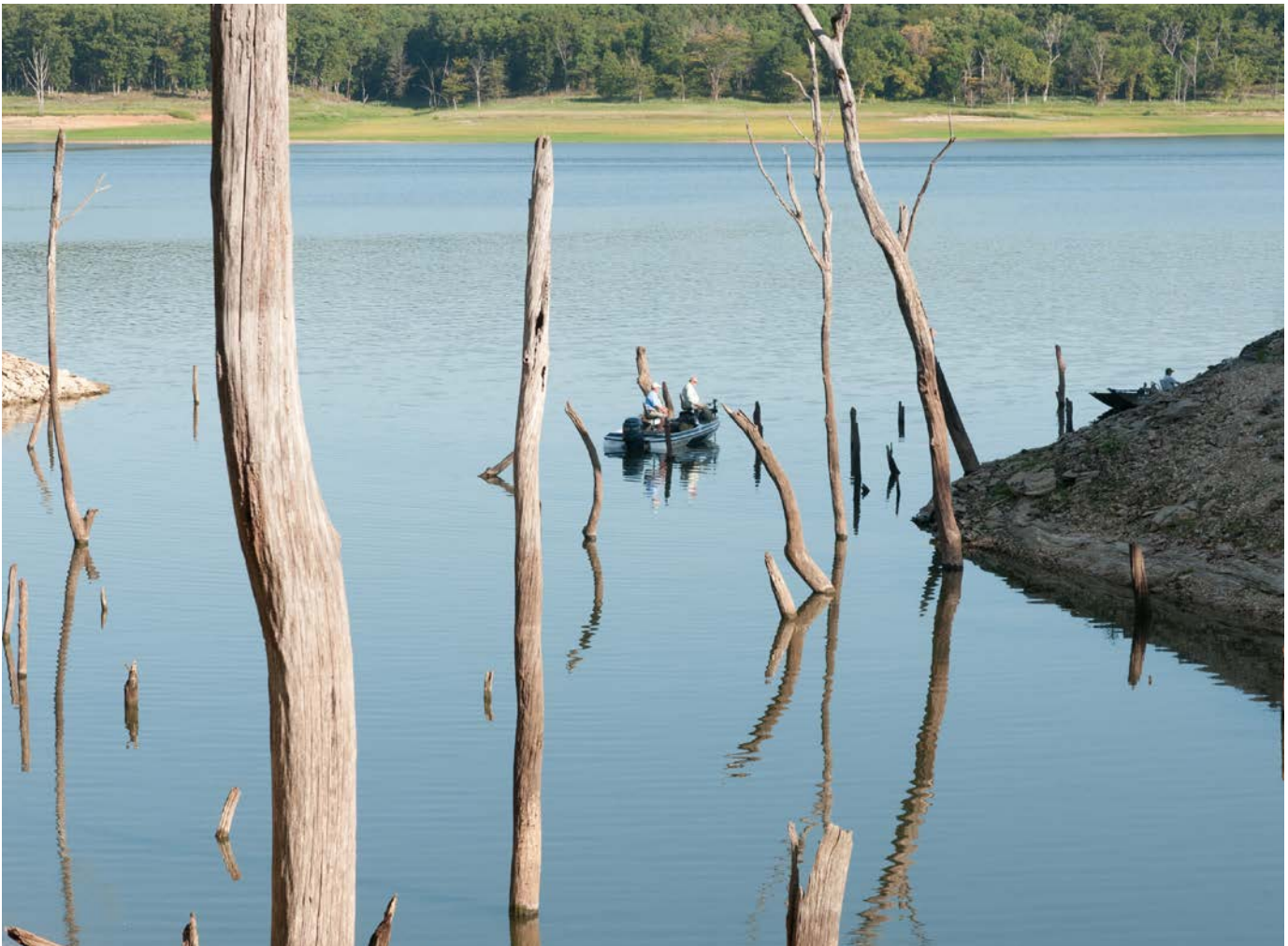
counties, which together serve more than 70,000 people in the North Fork Salt River Watershed.

waters. The North Fork Salt River Watershed in northeast Missouri is one of the first focus watersheds for the department's Our Missouri Waters effort.

The streams of this watershed flow to Mark Twain Lake, where the water serves as source water for the Clarence Cannon Wholesale Water Commission's (CCWWC) public water system. Their treatment plant provides drinking water to its member systems in 14 counties, which together serve more than 70,000 people.

So what happens when local citizens, landowners and agencies are invited to set goals for their watershed? They come together and have conversations about the priorities of their water resources and what needs to be done to improve their watershed for everyone's needs. That is what happened when the Clarence Cannon Dam was built 34 years ago.

"The dam and commission were game changers for the people in that area. They simply didn't have consistent access to safe



MoDNR file photo

(Opposite page) Streams of the North Fork Salt River Watershed flow into Mark Twain Lake, which serves as a source of drinking water to the Clarence Cannon Wholesale Water Commission's public water system.

(Above) In addition to drinking water, Mark Twain Lake is used for a variety of recreational activities.



MoDNR photo by Mary Culler

This is one of several cover crops employed on the Ethan Decker farm in Monroe County.

drinking water until then,” said Jerry Vineyard, retired MoDNR geologist, who worked with others to help create the CCWWC. “The Water Commission development was the most important contribution of my career.”

Building on the success of its predecessors, the North Fork Salt River Watershed Advisory Committee not only came together as a group of interested citizens, they created a Healthy Watershed Plan. In 2015, the department also collaborated with the water commission and local partners to sponsor a source water protection project, with the goal of increasing awareness about the watershed and promoting soil health.

“Efforts in the watershed benefit farmers by keeping soil and nutrients on their land, and a reduction in nutrients in Mark Twain Lake result in fewer algae blooms that negatively affect water treatment,” said Mark McNally, general manager of the CCWWC.

As part of this project, the water commission helped construct a Watershed Education Station – a 12-foot trailer that will be touring the state this year to help inform Missourians about water and their local watersheds. Find out more about the education station on page 21 in the DNR News section of this issue.

The water commission’s project also provided funding for cover crop seed for farms in the watershed. During 2015-2016, 40 farmers participated in the project by planting cover crops. Twenty-four-year-old Ethan Decker, who farms 750 acres in northwest Monroe County participated and planted 80 acres of cereal rye for the first time on his family farm.

“Weed suppression was the biggest benefit for the first year,” Decker said.

Seeing the benefits, he since planted a total

What Are Cover Crops and How Do They Help?

Cover crops are planted in the fall, typically after the main cash crops are harvested. They grow during late fall and winter and provide a living root in the soil. This helps protect the field from wind and water erosion. When used over several years, cover crops can reduce soil compaction, increase infiltration of water into the soil, boost the productivity of soil by increasing organic matter and capture and recycle nutrients. Cover crops typically are not harvested, but instead they decay on the field where they return nutrients to the soil.

The use of cover crop rotation is an ancient practice. By the 1860s, cover crops were common practice in American agriculture and remained so until the 1950s. In recent years, a new spotlight on the importance of soil health has brought significant attention to this practice across the nation and is employed by a growing number of farmers across the Midwest.

The department’s Soil and Water Conservation Program also funded \$93,605 for 41 cover crop contracts on more than 3,000 acres in the North Fork Salt River watershed in fiscal year 2016.

Including cover crops in a farming operation costs approximately \$20-\$50 per acre per year. However, after using cover crops for several years, producers may offset this expense by reducing other input expenses, such as pesticides and fertilizers, and through increased soil productivity and crop yields.

For Missouri watersheds, the use of cover crops in row crop fields can improve soil health and the sustainability of farmland.

I HOPE THAT COVER CROPS WILL EASE
THIS CHANGE, HELP BUILD ORGANIC
MATTER IN THE SOIL AND ALLOW
ME TO USE COVER CROPS FOR
GRAZING CATTLE.

— ETHAN DECKER



MoDNR photo by Mary Culler

of 400 acres in cover crops and increased the crop diversity to include a mix of five species – cereal rye, barley, rapeseed, turnips and crimson clover.

“I am trying to transition the farm from a conventionally tilled system to a no-till system,” Decker said. “I hope that cover crops will ease this change, help build organic matter in the soil and allow me to use cover crops for grazing cattle.”

Each watershed across the state has unique uses, challenges and opportunities. The department’s efforts provide a framework for people to plan for protection of the watershed where they live and work. These collaborative partnerships will lead to the long-term goal of maintaining and improving the health of Missouri’s watersheds for many years to come.

Mary Culler is the Northeast Watershed Coordinator and works in the Department of Natural Resources’ Northeast Regional Office in Macon.

(Top right) Ethan Decker, a Monroe County farmer, participated in the Healthy Watershed Plan by planting cover crops in his fields.

(Right) The waters of Mark Twain Lake border the shore at Mark Twain State Park near Florida.



MoDNR photo by Ben Nickelson



PARKS

PRESERVE

CCC LEGACY

by Tom Uhlenbrock

A fisherman nets a trout near the triple-arched CCC bridge at Bennett Spring State Park, Lebanon, on opening day of trout season, 2016.

MoDNR photo by Ben Nickelson

Missouri State Parks is celebrating 100 years. The late Booker Rucker was an employee of the park system for about half of that century, becoming its unofficial historian upon his retirement.

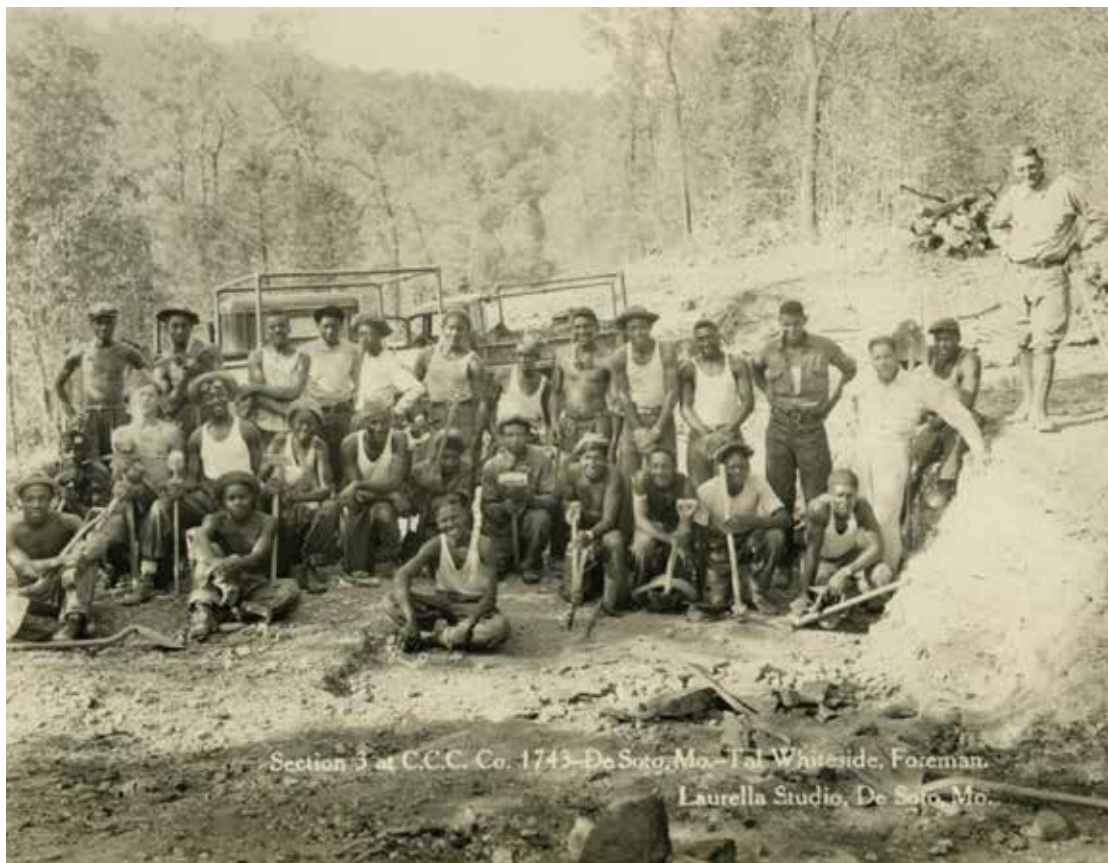
In an interview shortly before his death in 2016 at the age of 76, Rucker cited the work of the Civilian Conservation Corps (CCC) in Missouri as one of the greatest, long-lasting gifts to state parks.

“The CCC parks became our crown jewels,” he said. “The park resources were already there. The CCC construction was the icing on the cake.”

That work is still a mainstay of park amenities some 75 years later.

In 1933, under President Franklin Delano Roosevelt’s New Deal, Congress passed the Emergency Conservation Work Act with the purpose of putting young men to work and ending the Great Depression.

The Works Progress Administration was for skilled adults, and the CCC was for younger people who could help restore the nation’s devastated landscape.



MoDNR file photo

The crew of CCC Company 1743 built numerous structures at Washington State Park from 1934-1939. The iconic 1,000 Steps Trail is symbolic of the effort required for young men to move giant stone slabs of rock – work required of nearly every CCC endeavor.

Because of its natural beauty, the Ozarks of southern Missouri was targeted and the state's first CCC camps were established at Sam A. Baker, Meramec and Roaring River state parks.

Within a year, some 4,000 men between the ages of 18 and 25 were spread out in 22 CCC camps in Missouri, each with 200 men.

Of the \$29 million spent in Missouri between 1933 and 1937 on conservation and recreation, 95 percent of it came from federal funds.

The CCC workers were paid \$30 a month, plus housing, food and clothing. Of that total, \$22 was sent to the worker's home and they kept \$8 at the worksite.

Three million workers were employed throughout America under the CCC from 1933 to 1942. They planted 33 billion trees, developed more than 800 state parks and built 204 lodges and museums.

CCC creations that have become iconic landmarks in Missouri parks include: the graceful, triple-arched bridges that reflect over the waters of Bennett Spring and Cuivre River state parks; the sturdy stone cabins at

Sam A. Baker and Meramec state parks that are family favorites for summer vacations; the stone bridges, group camps and network of stone-ditch-dams that are part of the national historic district of CCC structures at Lake of the Ozarks State Park; and the 22 structures at Babler State Park, including the stable building, which features classic CCC-style stonework.

With the advent of World War II, the CCC program was disbanded and most of the workers either enlisted or were drafted into the military.

Their jobs were over, but the results of their work remain evident across the nation, including the state parks of Missouri where it is, as Rucker said, "the icing on the cake."

SIMPLE, RUSTIC "PARKITECTURE"

The National Park Service managed the CCC projects and was directly responsible for the high quality of work still obvious today, said John Cuning, who directs management and interpretation for the Missouri state parks system.



In Missouri, especially in the Ozarks, you will find stonework and timber, or log cabin style construction. Visit a CCC park in the Southwest, and it's going to look a lot more like adobe and sandstone. —John Cunning



(Top) The stable at Babler State Park, near Wildwood, is a classic example of CCC stonework.

(Right) A stone CCC cabin at Meramec State Park, Sullivan, graces this wooded setting on the park's 2,441 acres.

MoDNR photo by Ben Nickelson

“The National Park Service called it ‘rustic architecture’,” Cunning said. “Today, we use the term ‘parkitecture’ because it is so symbolic of what you see in state and national parks across the country – not just in Missouri.”

Professional landscape architects were brought in and designed the structures to blend into the surroundings. Buildings were low and made of stone-and-timber construc-

tion. The stone was quarried locally and left in somewhat rough form and the logs were harvested from nearby forests and often hand-hewn.

“In Missouri, especially in the Ozarks, you will find stonework and timber, or log cabin style construction,” Cunning said. “Visit a CCC park in the Southwest, and it’s going to look a lot more like adobe and sandstone.”

HAPPY TO BE THERE

CCC crews worked in 15 Missouri state parks, most of them in the Ozarks. A total of 342 structures built in the state park system are now listed in the National Register of Historic Places.

Crews included the black Company 1743 that worked at Washington State Park between 1934 and 1939.

At Washington State Park, the men of 1743 built a dining hall decorated with a stone thunderbird like the one found in ancient Indian carvings at the park.

Other projects included an octagonal shelter high on a bluff overlooking the Big River valley and the 1,000 Steps Trail, where giant stone slabs were muscled into place to form stairways up and down a hillside.

Washington State Park received an unexpected bonus recently with the visit of Mary Mears, a Cleveland woman whose father was one of two white foremen who worked with Company 1743. Mears presented the park with her family's collection of historic photos taken of the men working, and playing, in the park. Although they toiled long, hard days, the men in the photos were smiling.

"Everybody was happy to be there," Mears explained. "This was the Depression, jobs were hard to find."

Company 1743 later moved to Mark Twain State Park and built a shelter and the Buzzard's Roost overlook that stands on a bluff towering over Mark Twain Lake.

Their work at Mark Twain was cut short by the call to war.

THE LEGACY LIVES ON

Missouri State Parks strives to ensure the future of its CCC legacy. Cabins are remodeled, roofs are replaced and dining halls are updated to sustain these historic structures.



A prime example is the CCC Lodge at Roaring River State Park. The handsome three-story lodge of limestone blocks and white oak timbers is the centerpiece of the 33 CCC-era structures in the park.

The lodge had served a variety of purposes over the years, and was last a park store before it closed in 2009 because of much needed repairs.

In spring 2016, work was completed on a \$1.2 million renovation of the lodge and the historic structure was reopened. Roaring River is one of the state's three popular trout parks. Renovations also are completed or underway at the other two – Bennett Spring and Montauk.

At Roaring River, like at other CCC and WPA projects, the work preserved the exterior of the building while updating the interior.

(Above left) A bronze statue of a CCC worker was erected at Roaring River State Park, Cassville, on May 4, 2013. This statue is one of 68 across the country that honors the CCC.

MoDNR photo by Tom Uhlenbrock

(Above) This monument at Meramec State Park is dedicated to CCC companies 739 and 2728.

MoDNR photo by Ben Nickelson

*Because of the extensive CCC work
at Roaring River, the park
was chosen for a memorial and
statue to honor the 7,000 men
who worked there from
1933 to 1939.*

The lodge got a new roof and exterior paint, and the interior was remodeled with four rental suites on the second level and three on the third.

The lodge is a fixture on the gravel bank, a short distance from the spring that pumps out 20.4 million gallons of water each day to form the headwaters of Roaring River.

A fish hatchery near the spring was also built by the CCC crew. As it does at all three trout parks, the Missouri Department of Conservation operates the hatchery and rears and stocks the rivers with rainbow trout.

Kerry Hays, natural resource manager at Roaring River, said the CCC Lodge has been an important part of the park, historically and culturally.

“We get three or four generations of visitors and they remember when the CCC Lodge was active,” Hays said. “The renovated lodge is a great place for family reunions because they can rent the banquet hall on the lower floor.”

Because of the extensive CCC work at Roaring River, the park was chosen for a memorial and statue to honor the 7,000 men who worked

(Below) The interior of the CCC Lodge at Roaring River State Park has been updated with modern amenities. Originally completed in 1938, the lodge was built by the WPA, adhering to the popular CCC-era style of construction. (Bottom) While the interior was updated, the iconic exterior of the lodge remains the same.



MoDNR photos by Ben Nickelson



there from 1933 to 1939.

The park dedicated the memorial in 2011, and one of the surviving CCC workers who attended raised money for a bronze statue. Dedicated in 2014, the statue depicts a muscular CCC worker, bare-chested and with a double-bladed ax at his side.

Some of the original CCC workers also attended the reopening of the CCC Lodge and received tours, Hays said.

“They were thrilled that the state parks system would go through the effort to see that the building lives on,” he said. “That meant that the legacy of their fathers and grandfathers lived on as well.”

Tom Uhlenbrock is a writer for Missouri State Parks, a division of the Missouri Department of Natural Resources.

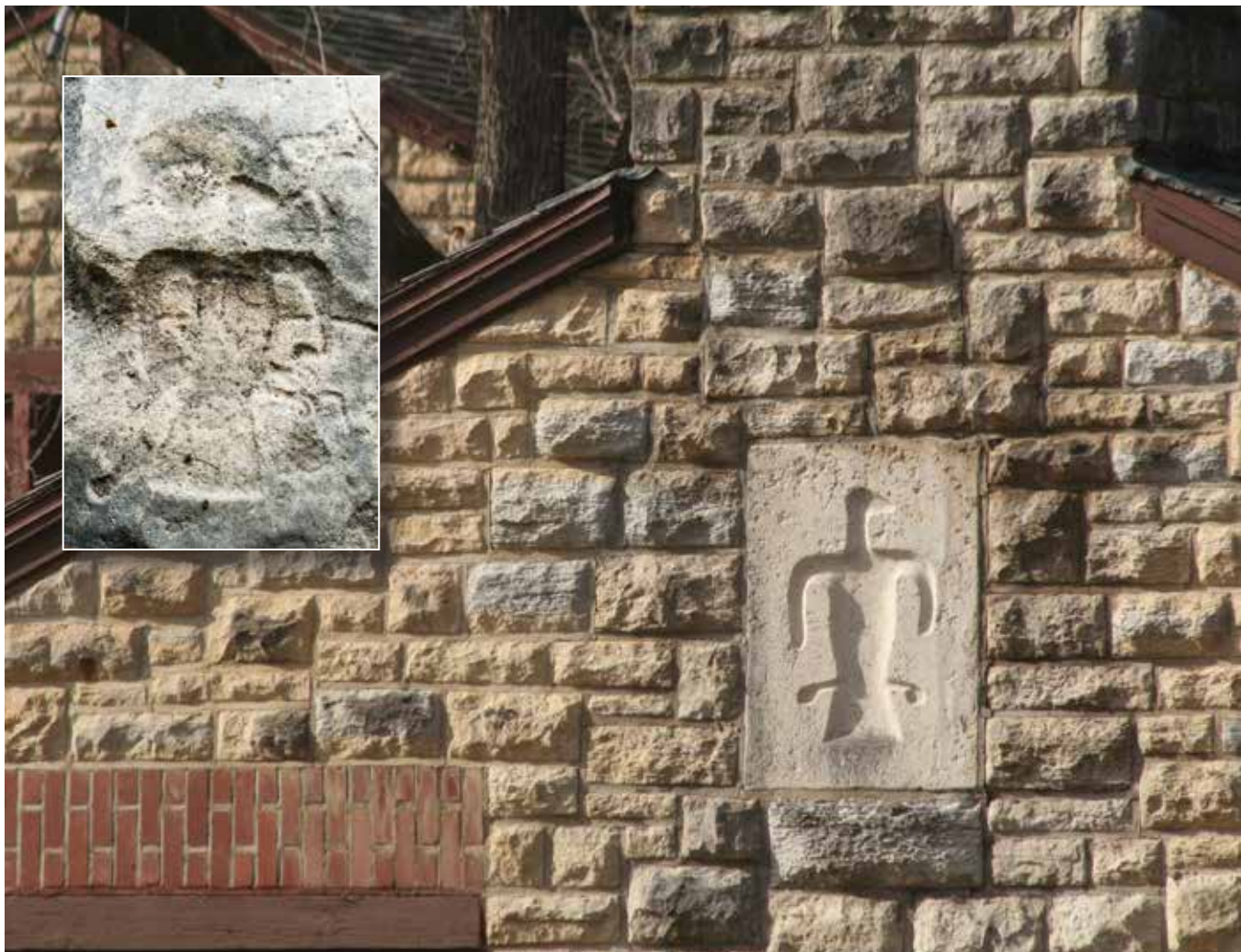


MoDNR photo by Ben Nickelson

(Right) An octagonal CCC shelter overlooks the Big River Valley at Washington State Park, near De Soto.

(Below) CCC Company 1743 decorated the dining lodge at Washington State Park with a thunderbird, based on a petroglyph that was found in the park. The crew then moved north to Mark Twain State Park until World War II ended the CCC's proud reign.

(Inset) Carved into sandstone, this petroglyph was the actual inspiration for the CCC design. MoDNR photo by Ben Nickelson



MoDNR photo by Tom Uhlenbrock

TRAVELING THE ROCK ISLAND SPUR

by Hannah Campbell

photographs by Ben Nickelson

Hikers, bikers, equestrian riders and lovers of Katy Trail State Park, now have an additional 47.5 miles to explore. The Rock Island Spur of Katy Trail State Park connects the Katy Trail from Windsor to Pleasant Hill in western Missouri. This rails-to-trails extension connects two of Missouri's biggest metro areas, Kansas City and St. Louis.

"This connection allows trail users to essentially ride from one side of the state to the other on a dedicated trail, which is so unique," said Melanie Smith, Katy Trail Coordinator. "This type of ride is certainly on the 'bucket list' for many trail enthusiasts."

As with the rest of the Katy Trail, this spur is a rails-to-trails project that turns unused railways into usable trails.

Kansas City citizens now have much shorter, easier access to the Katy Trail. Their journey begins in Pleasant Hill, a small railroad town of less than 10,000. The stop there includes local restaurants, a bike shop perfect for cyclists, and the old railroad depot, which has been remodeled to include shops and an office. On the other end of the Rock Island Spur, roughly 47 miles away, is the town of Windsor. Windsor is no rookie when it comes to hosting Katy Trail visitors as it has been doing it for dozens of years, with several camping areas and food stops made readily available.

"The communities along the trail are very excited to see the trail open to the public," said Smith. "We are already seeing businesses develop and community members asking how they can help to make the trail better and more inviting."

Travelers along the trail also will be able to make pit stops to refresh and rejuvenate at three trailheads in Leeton, Chilhowee and Medford. At Medford one will see the very large Rock Island Lake, a former area for refilling steam locomotives.

Along with the trailheads, two other parking areas will be available at trail intersections with Highway P and Purvis Road in Cass County.

"The connection to Kansas City also opens up a world of possibilities for connections to other trail systems and access to a variety of parks and facilities that would otherwise only be open to those traveling by vehicle," said Smith.

The trail officially was opened earlier in December 2016 on a cold, crisp day. Despite the chilly temperatures, community members gathered to witness this historic moment and be one of the first to walk or bike the new trail miles.

Hannah Campbell was an intern for Missouri State Parks, a division of the Missouri Department of Natural Resources.



(This page and opposite page top) At Windsor, the Katy Trail crosses above the Rock Island Spur, with a connecting trail between them.



(Left) A local resident walks his dog between the Chilhowee and Leeton trailheads.

(Below) A bicyclist cruises past Rock Island Lake near Medford.

Department Awards \$95.5 Million to St. Louis MSD

The Missouri Department of Natural Resources has awarded \$95.5 million in financial assistance to the Metropolitan St. Louis Sewer District (MSD) to upgrade sewer collection infrastructure.

The work allows continuing rehabilitation of the district's collection system, including approximately 265 miles of sanitary sewers and 5,500 man-holes. The improvements will help ensure the system is operating in a safe and healthy manner for its 1.3 million citizens and surrounding environment.

The funding consists of two low-interest loans through the Clean Water State Revolving Fund in the amounts of \$20 million and \$75.5 million. The funding provides MSD with the upgrade resources while potentially saving more than \$30 million over the life of the below-market-rate loans.

The State Revolving Fund provide fi-

financial assistance to communities with infrastructure needs for water quality, wastewater and drinking water.

The rehabilitation work will reduce the flow of groundwater and stormwater into the collection system, lessening the impacts on MSD's collection system and wastewater treatment facilities. This will improve water quality in the Bissell, Coldwater, Lemay, Meramec and Missouri watersheds.

The department's Water Protection Program will administer the funds, which are funded wholly or in part with monies from the U.S. Environmental Protection Agency. For more information, visit dnr.mo.gov/env/wpp/srf.

Land Reclamation Program Evaluated

The Department of Natural Resources' Land Recla-



mation Program's Coal Regulatory and Abandoned Mine Land programs recently were evaluated by the U.S. Department of the Interior Office of Surface Mining Reclamation and Enforcement office (OSMRE).

The report describes OSMRE's oversight process and identifies the accomplishments and successes of the Land Reclamation Program for the evaluation period of July 1, 2015-June 30, 2016. OSMRE concluded the program is successfully protecting the environment and public from off-site impacts resulting from surface coal mining and reclamation operations; ensuring successful reclamation on lands affected by coal mining, and; fulfilling its public participation requirements during the permit process.

The Surface Mining Control and Reclamation Act of 1977 created OSMRE, which authorizes the oversight and implementation of federal

Time Exposures

In 1933, a St. Louis civic booster named Luther Ely Smith was taking a train home when he was struck by the poor condition of the city's riverfront. An idea was born – build a monument that would not only pay tribute to the westward expansion of the nation, but also revitalize the historic riverfront. With the support of the mayor, the National Expansion Memorial Association was organized in 1934 and work began to fund the project and acquire the land necessary to make it a reality.

A presidential proclamation designated the Jefferson National Expansion Memorial as the nation's first National Historic Site as the National Park Service began to acquire nearly 40 city blocks on the riverfront through condemnation proceedings. Legal challenges held up land acquisition until 1939, because property owners claimed the acquisitions were an unjust land grab.

On Oct. 10, 1939, clearing of the riverfront properties began as Mayor Bernard Dickmann removed the first three bricks from an old warehouse at 7 Market St. The project created thousands of jobs through New Deal funding. This 1939 photo by famed Farm Security Administration photographer Arthur Rothstein, depicts wheelbarrows stacked and ready for use as part of the Works Progress Administration contribution to the riverfront improvement project. The area is now home to the iconic Gateway Arch, which was completed on Oct. 28, 1965.

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Send your photo to "Time Exposures," c/o Missouri Resources, PO Box 176, Jefferson City, MO 65102-0176. It is preferable to send a photographic reproduction (no scans). Although returned originals will be sent via insured mail, professional copies are safest. Pre-1980 environmental, historic/cultural and natural resource images will be considered. Include date, location, description and other details of interest to readers.

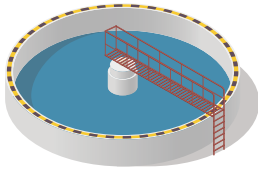


Library of Congress photo, Prints and Photographs Division, Farm Security Administration/Office of War Information Photograph Collection [LC-DIG-fsa-8a10911]

funding to state regulatory and abandoned mine land programs.

The report is available online at dnr.mo.gov/geology/lrp/docs/16annualevaluationreport.pdf.

MoDNR Awards \$139,000 in Wastewater Upgrade Grants



Three Missouri cities received wastewater system improvement grants totaling more

than \$139,000. The cities of Ava, Waverly and Hallsville received the funds through the department's Small Community Engineering Assistance Program for the evaluation of proposed wastewater treatment upgrades and collection system repairs.

Ava will employ its \$39,600 grant to develop a facility plan that will evaluate upgrades necessary to meet new permit limits for disinfection. The plan also will evaluate the wastewater collection system for inflow and infiltration issues. The facility plan is estimated to cost \$49,500 and be completed in April.

The cities of Waverly and Hallsville each received \$50,000 grants to evaluate wastewater collection system repairs. Similarly, both communities will use the grant to develop a plan to evaluate their systems for inflow and infiltration issues. Inflow and infiltration can be groundwater, stormwater or drinking water flowing directly into the sewer system. This results in higher volumes of water being unnecessarily transported and treated which increases costs and energy usage. Both facility plans are expected to cost \$62,500. The Waverly plan should be completed in May; Hallsville's is anticipated to be finished in March 2018.

These grants provide opportunities for small communities to examine local infrastructure and make repairs that ensure safe and healthy operations for citizens and the environment.

The department will administer the grant funds and works with communities to assist with water and waste-

OUR MISSOURI WATERS

Watershed Education Station (WES) Hits the Road in Missouri

Where does your water shed? There is a new billboard traveling across Missouri on four wheels sharing information about watersheds. The Watershed Education Station (WES) was recently completed by the Clarence Cannon Wholesale Water Commission through the Department of Natural Resources' Source Water Protection Grant Program.

WES is a 12-foot trailer that showcases why water conservation is important in Missouri. Inside WES, there is a rainfall simulation table that illustrates how different land management practices affect runoff and infiltration of rainwater. There are also interactive games and models that can be used to teach about water and watersheds. On the outside of WES, the concession door opens up to display a TV/DVD player that can show educational videos. With the help of WES, more Missourians will be able to answer the questions, "Where does your water shed?" and "What can I do to keep it healthy?"



MoDNR photo by Mary Culler

The WES unit is shown here, near Paris. It offers multimedia capability for numerous events.



water infrastructure improvement projects. The department's Water Protection Financial Assistance Center assists with funding for communities with water quality, wastewater and drinking water infrastructure needs.

For more information, visit dnr.mo.gov/env/wpp/srf/.

Updated Geologic Bedrock Map Available

The department's Geological Survey Program completed its most recent version of a statewide geologic map. Last updated in 2003, the 2017 version of the map includes new bedrock mapping information from hundreds of new mapping projects conducted by the program's geologists as well as mapping by educational institutions.

Bedrock maps provide information

about the distribution and structure of consolidated rock such as limestone, sandstone, coal and granite. This information includes the layering of bedrock units as well as faulting, folding or deformation that may be present.

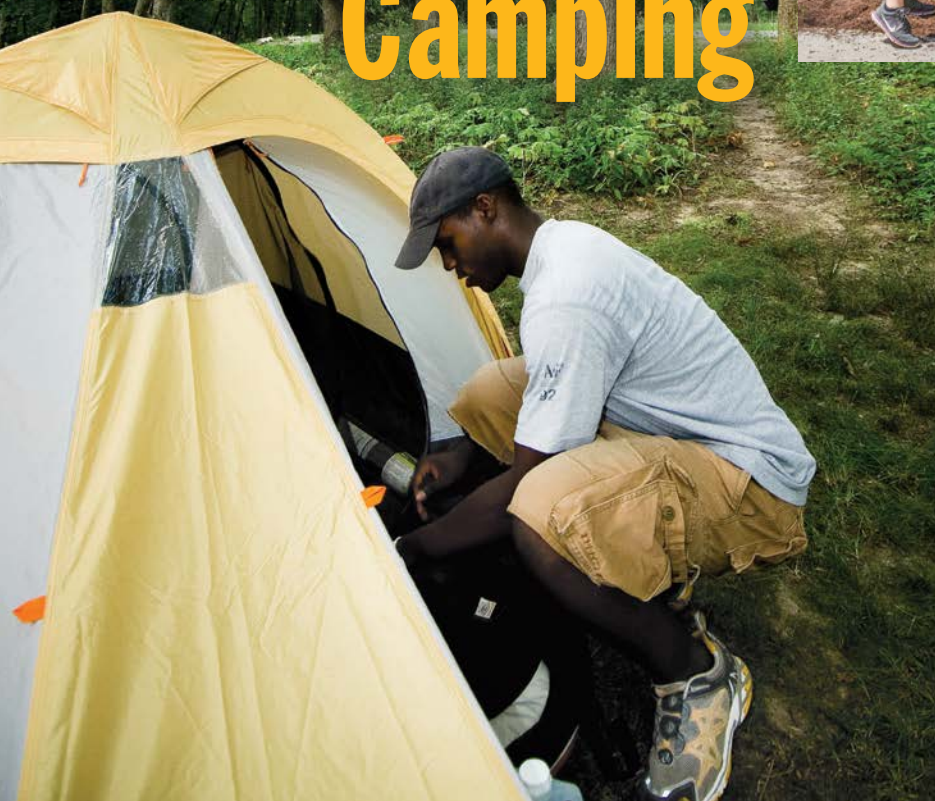
If you would like to obtain a copy of the new bedrock geologic map or others, visit the Missouri Geology Store at 111 Fairgrounds Road in Rolla, order at missourigeologystore.com, or call 573-368-2100.

For news releases on the web, visit dnr.mo.gov/news.

For a complete listing of the department's upcoming meetings, hearings and events, visit the department's online calendar at dnr.mo.gov/calendar/search.do.

Looking for a job in natural resources? Go to dnr.mo.gov/hr.

Top Spots for Rustic Camping



(Above) A guest at Cuivre River State Park, near Troy, sets up camp at one of the park's five walk-in campsites. MoDNR file photo

(Above right) Timbuktu Campground at Echo Bluff State Park in Shannon County is the newest in the system, featuring 12 walk-in campsites.

(Below) Each of the 14 walk-in sites at Johnson's Shut-Ins State Park in Reynolds County includes a tent pad for guests to secure their tents off the ground.



MoDNR photo by Ben Nickelson

While many people enjoy getting away in an RV, a cabin or a lodge at a state park, others prefer to spend a night under the stars with fewer amenities. Missouri State Parks aims to create a place that is suited for all lovers of the outdoors.

For the campers who want to feel closer to nature when they stay the night at a state park, several parks offer walk-in campsites, which require guests to walk 50-500 feet to get to their campsites. These basic campsites allow for a more solitary experience, giving campers the opportunity to experience the great outdoors.

Echo Bluff State Park provides 12 basic, walk-in campsites that are perfect for guests who want to get away from it all. Walk-ins are available year-round; reservations are not required but are encouraged. Included in a walk-in campground is a parking pad, table, grill and lantern post. They do not include electric power supply or water hook-ups, which adds to the rustic feel many campers aim to experience.

Johnson's Shut-Ins State Park also offers walk-in camping for guests to enjoy the stunning Ozark landscape. Camping on these sites gives people the chance to "rough" it, while still being close enough to civilization that they could go back at any time if needed.

Other parks that offer walk-in primitive campsites perfect for a time of solitude are Long Branch, Taum Sauk Mountain, Cuivre River, Hawn, St. Joe and Wallace state parks.



*Missouri State Parks – a division of the
Missouri Department of Natural Resources*

MoDNR file photo



Dell Rim Trail

at Ha Ha Tonka State Park

Ha Ha Tonka State Park is well known for both its unique history and the quality and number of its remarkable geological features. The park's Dell Rim Trail provides an opportunity for hikers to get a glimpse of both.

Initially, Dell Rim Trail goes through a rocky, south-facing glade area with an abundance of wildflowers. The first highlight along the trail is a one-way series of steps that lead to the water tower. The tower was constructed in 1905 to supply water to the castle and built on the property by a wealthy Kansas City businessman, Robert M. Snyder.

A wooden boardwalk then leads visitors to a panoramic overlook above the 150-foot-deep Whispering Dell Sinkhole. This initial section of Dell Rim Trail is wheelchair accessible.

The trail continues from the Whispering Dell overlook with a series of steps that connect the trail to Colosseum, Spring and Devil's Kitchen trails. As hikers circle the Whispering Dell Sinkhole, they can look back to see the overlook and water tower across the void. The trail takes hikers part way down the 316 wooden steps to Ha Ha Tonka Spring, ending at a second overlook in the saddle between Whispering Dell Sinkhole and Ha Ha Tonka Spring.

The boardwalk to the first Whispering Dell Overlook, .07 miles long, is stroller and wheelchair accessible, but the step portions to the second overlook are steep and can be difficult for some hikers.

(Left) Hikers return to the main trail from the spur that leads to the water tower.

(Below) A park guest and his dog view the Whispering Dell Sinkhole from an overlook along the trail.



Focus on Fossils

starfish

Starfish, or sea stars, are a class of echinoderm, meaning “spiny-skinned,” invertebrates that came into existence during the early part of the Paleozoic Era about 470 million years ago and have persisted to present day.



The pictured fossil starfish, tentatively identified as the extinct species *Compsaster formosus*, is from the 340-million-year-old Mississippian-age Burlington-Keokuk Limestone in northwestern Greene County. It measures 2.6 inches from tip of arm pointing upper left to tip of arm pointing right. The bottom exterior of the starfish is shown, complete with closed ambulacral grooves and mouth. MoDNR file photo

The name “starfish” alludes to their star-shaped bodies, which are composed of a central disc, from which five arms typically extend out in one plane. Some species have more arms.

Starfish have an internal skeleton that comprises numerous small pieces (ossicles) of calcium carbonate, in the form of the mineral calcite, that are held together by fibers of collagen. Outer surfaces of ossicles can be smooth, granular, warty or spiny. A starfish can open and close its underside along grooves located on each arm. These grooves, called ambulacral grooves, extend from tip of each arm to the middle of the central disk. The starfish’s mouth forms where the grooves converge. Sides of ambulacral grooves are lined with a row of tube feet, used by the starfish to move. The anus is on the top side, opposite the mouth. An eyespot is located on the tip of each arm.

Starfish are marine bottom dwellers that live in the intertidal zone to a depth of 20,000 feet. They crawl slowly on the seafloor and over objects using their tube feet. They can scale vertical sea cliffs. Maximum speed is 9 feet per minute.

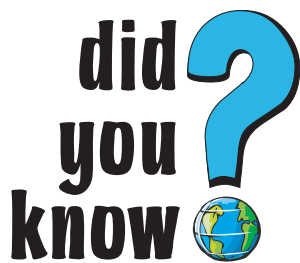
Today, starfish are preyed upon by fish, crabs, large snails, gulls and sea otters. Starfish can regenerate arms that have been lost

to predators. Remarkably, a severed arm can regenerate into a whole starfish. Most are predators of other bottom-dwelling organisms such as clams, snails, sponges, corals, arthropods, small fish and even other starfish. Some do scavenge decomposing organic matter and fecal matter. They are capable of turning their stomach inside out from their mouth to aid in feeding.

Starfish belong to the Kingdom: Animalia; Phylum: Echinodermata (“Echinoderm” includes sea stars, brittle stars, sea urchins, sand dollars, sea cucumbers, crinoids, blastoids, etc.); and Class: Asteroidea (“Asteroid” means star-shaped).

Approximately 1,500 species of starfish are alive today. The number of extinct species is unknown because few were preserved as fossils. Upon death, their bodies easily fall apart and the small ossicles were scattered by scavengers and ocean currents. The remains mixed with bottom sediment that eventually turned into rock. Fossils of whole starfish are rare.

See numerous fossils at the Ed Clark Museum of Missouri Geology. Located at 111 Fairgrounds Road, Rolla, the museum is open weekdays from 8 a.m. to 5 p.m. Learn more: dnr.mo.gov/geology/edclarkmuseum.htm.



Major Appliances Banned From Landfills

In an effort to conserve landfill space, promote recycling, and reduce the chances of environmental contamination, some waste is banned from landfills. Items such as major appliances, scrap tires,

mechanical and fuel oils, and lead-acid batteries are not allowed in landfills.

Major appliances banned from landfills include refrigerators, freezers, washers and dryers, stoves/ovens, dishwashers, trash compactors, water heaters and other “white goods.” White goods encompass large electrical items and are referred to as such because they commonly are painted with a white enamel finish. Microwave ovens are still allowed in landfills, but it is recommended that they be recycled.

When buying a new appliance, it’s smart to see if there is a program to take it back when it reaches end-of-life. Ask if they will take the appliance you are replacing, too. If a unit you no longer need still works, consider donating

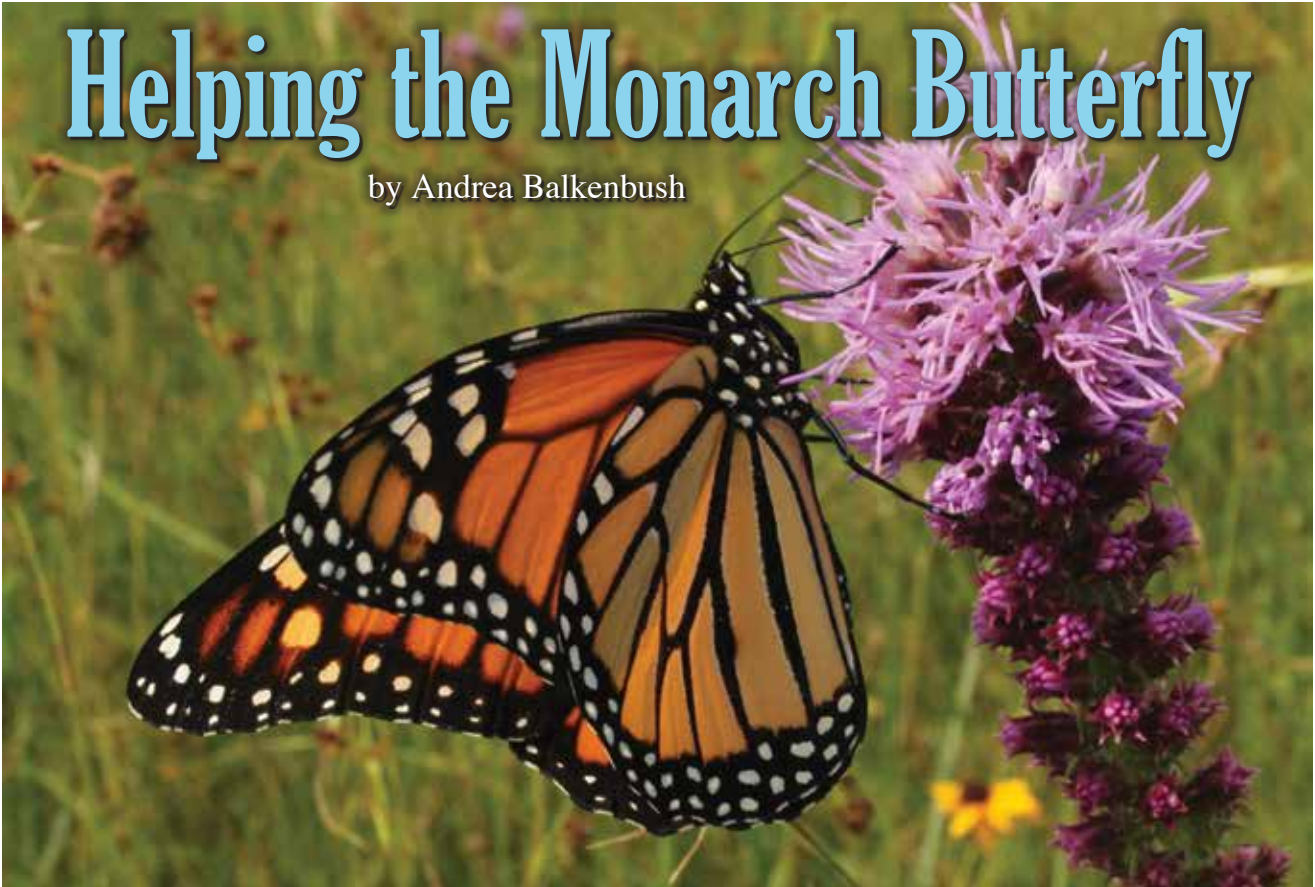
it to a charitable organization. Otherwise, contact scrap metal collection centers or other recycling centers in your area and ask if they take major appliances. Some will come pick it up for you.

To find locations to recycle appliances, as well as used oil, scrap tires, or lead-acid batteries, contact your solid waste management district or visit dnr.mo.gov/env/swmp/swmd/swmdinfo.htm to locate your district information. Read more about items banned from landfills by accessing the department’s fact sheet, “What to Do With Items Banned From Landfills,” at dnr.mo.gov/pubs/pub186.htm.



Helping the Monarch Butterfly

by Andrea Balkenbush



Bruce Schuette photo

The monarch is one of the most familiar butterflies in North America. The orange-and-black species is known for its annual, multi-generational migration from Mexico to as far north as Canada. Monarch populations have decreased considerably over the past 20 years due to habitat loss in the United States and Mexico. One of the serious habitat losses is the dwindling availability of native milkweed in the Midwest.

Missouri is a particularly important state for monarchs because it lies within the spring and fall migratory path and is a major breeding area during the spring. Without adequate milkweed habitat, the cycle and population is at risk.

The Department of Natural Resources has a long history of protecting and restoring Missouri's natural landscapes in our state parks, however, there are many more opportunities to contribute. Partnering with entities to restore severely degraded former mine-waste sites back to native prairie in Webb City, Mo. is one example.

The department also is incorporating a monarch and pollinator seed mix in some coal mine reclamation projects. These restored areas will feature native prairie plants including several species of milkweed and many other wildflowers. These additions will improve habitat for monarch reproduction and feeding.

To help more people appreciate the issues surrounding the monarch and how they can help, the department's Youth Education and Interpretation program has developed webpages about the monarch butterfly migration, annual cycle, life cycle and habitat needs. The website also provides detailed information about how anyone can take action and start a monarch butterfly garden. Go to dnr.mo.gov/education/monarchs/ for more information.

With combined efforts from all Missourians, our region can provide enhanced habitat for monarchs and all pollinators. Creating monarch habitat also supports the needs of other pollinators. Did you know that every third bite of food we eat is reliant upon pollination?

Together, we can once again fill the skies with monarch butterflies, support pollinators, and ourselves.

Andrea Balkenbush is chief of outreach and education for the Missouri Department of Natural Resources.



See Partnering for Missouri's Prairies in the Winter 2017 issue of *Missouri Resources* for more details about the Webb City prairie restoration project.

(Top) A monarch butterfly feeds atop a prairie blazing star, one of several native wildflowers that support the threatened insect.

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for a full listing of
fun activities at a state park
or historic site near you.



*Missouri State Parks – a division of the
Missouri Department of Natural Resources*

